

We Claim:

1. A controller for controlling a pump unit of an oil well comprising:
  - a) a sensor having a first and second probe for placement in the flow of oil from the  
5 well bore;
  - b) power generation means for generating a substantially constant power;
  - c) a first heater in said first probe adapted to be connected to said power generation  
means;
  - d) temperature-sensing means at each of said first and second tips respectively for  
10 generating a signal indicative of the temperature measured at each said first and  
second probes;
  - e) control means for receiving said signals from said temperature sensing means and  
determining a flow rate therefrom and generating a pump control signal in  
response to said flow rate, said pump control signal for continuously varying a  
15 predetermined parameter of a pumping unit during operation of said pumping  
unit.
2. A controller as claimed in claim 1, said predetermined parameter being said pump  
speed.  
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3. A controller as claimed in claim 1, said first heater being a resistor.
4. A controller as claimed in claim 3, said power generation means being a first constant  
current power source.  
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5. A controller as claimed in claim 1, said temperature-sensing means being a resistance  
device having a substantially linear change in resistance in response to ambient  
temperature change.  
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6. A controller as claimed in claim 5, said resistive device being a linear RTD.

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7. A controller as claimed in claim 1, including a second heater in said second probe adapted to be connected to said power generation means.
- 5    8. A controller as claimed in claim 7, including switching means for selectively connecting either said first or second heater to said power generation means.
9. A controller as claimed in claim 5, including a second constant current power source adapted for connection to said resistive devices.
- 10    10. A controller as claimed in claim 9, said control means including an analog-to-digital converter for converting said signals generated by said resistive devices to a digital signal.
- 15    11. A controller as claimed in claim 1, said control means including a processor means, said processor means comprising:
- a) means for storing an established flow time, shut-in time, a time-out period and a low-flow point;
- 20    b) means for determining a temperature difference between said first and second temperature sensing means said temperature difference being indicative of a flow rate in said well;
- c) means for storing said flowrate;
- d) means for comparing said flowrate with said low-flowpoint and for updating the timing-out period if said flowrate is greater than said low-flow point; and
- 25    e) means for generating said output signal to turn said pump unit off when said timing-out period has expired and for turning on said pumping unit when said shut-in period has expired.
- 30    12. A controller as claimed in claim 11, including means for determining a rolling average of said flowrates.

13. A controller as claimed in claim 1, said control means including a processor means, said processor means comprising:

- a) means for determining a temperature difference between said first and second temperature sensing means said temperature difference being indicative of a flow rate in said well;
- b) means for generating said output signal being indicative of a pump speed;
- c) means for storing a table of flowrates versus said predetermined pump speeds;
- d) means for determining a rolling average of said flowrates;
- e) means for comparing said current rolling flow average to a stored flowrate and either incrementing said pump speed if said stored flowrate exceeds said average, or decrementing said pump speed if said flowrate is less than said average; and
- f) means for updating said table.

15 14. A method of controlling a pump unit of an oil well comprising the steps of:

- a) placing a sensor having a first and second probe in the flow of oil from said well bore;
- b) generating a substantially constant power by a power generation means;
- c) connecting a first heater in said first probe said power generation means;
- d) generating a signal indicative of the temperature measured at each said first and second probes by temperature sensing means at each of said first and second tips respectively;
- e) receiving said signals from said temperature sensing means at a control means;
- f) determining a flow rate; and
- g) generating a pump control signal in response to said flow rate, said pump control signal for continuously varying a predetermined parameter of a pumping unit during operation of said pumping unit.